

VALUE BASED QUESTIONS

1. CARBON AND ITS COMPOUNDS

Q.1. Preetam and Satnam were revising the chapter on Carbon and Its Compounds. Preetam said, "It is quite amazing that diamond and graphite are both allotropes of carbon but the two have completely different properties. While diamond is the hardest material, graphite is soft".

- (i) What is the cause of different nature of these two substances ?
- (ii) What different properties are exhibited by the two substances ?
- (iii) What is the core of lead pencils ?

Ans. (i) The different nature of the two substances is because of different bonding. In diamond, each carbon atom is bonded to four other carbon atoms forming a rigid three dimensional structure.

In graphite, each carbon atom is bonded to three other carbon atoms in the same plane giving a hexagonal array. The fourth valency is satisfied by weak bonding between carbon atoms in one plane with the corresponding atoms in the other planes above and below a particular plane.

(ii) (a) Diamond is a hard material because of three dimensional covalent bonding while graphite is a soft material because of weak bonding between hexagonal arrays in different planes.

(b) Diamond is a non-conductor while graphite is a conductor of electricity.

(iii) Lead pencil is a misnomer. Actually it is graphite which the core of the pencil is made of.

Q.2. Public transport in Delhi runs on CNG. This is a pollution free fuel. There were lots of hurdles in bringing CNG in public transport system. But ultimately government of Delhi succeeded in achieving this goal. According to a world study, Delhi's environment now much cleaner than what it used to be with Diesel as a fuel.

- (i) What is the full form of CNG ? What is the main constituents of this fuel ?
- (ii) How is the fuel energy efficient ?
- (iii) Give the formula and names of the next two higher homologues of the main constituent of CNG.

Ans. (i) Full form of CNG is compressed natural gas. Main constituent is methane, CH_4 .

(ii) This is a compound with maximum number of hydrogen per atom of carbon. This raises the fuel efficiency of this fuel.

(iii) Next two higher homologues are

C_2H_6 , Ethane

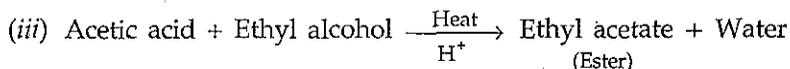
C_3H_8 , Propane

Q.3. Saksham and his sister Ruchi were taking their lunch at home on Sunday. The pickle that was served to them was very tasty. This was prepared by their grandmother. "Granny, how do you prepare such pickles and why don't they get spoiled even after months" asked the children. "This is a secret, I won't reveal it", said grandma. But the children insisted her to tell the same.

- (i) What was the secret behind the shelf life of the pickle ? How does it act ?
- (ii) Name the former and the latter homologues of this substance.
- (iii) How does this substance react with ethyl alcohol ?

Ans. (i) The grandmother used to add vinegar, which is a 5-10 per cent solution of acetic acid (CH_3COOH) in water. Acetic acid kills the bacteria and protects the pickle from getting spoilt.

(ii) Formic acid (HCHO) and Propionic acid ($\text{CH}_3\text{CH}_2\text{COOH}$) are the homologues of acetic acid.



Esters are sweet smelling compounds.

Q.4. Shanky and Bunty were returning home after attending a wedding. They had enjoyed the dishes served in the party. Their father was driving the car. Suddenly, midway a police party stopped them. A breathalyser was put in the mouth of their father and he tested positive for alcohol. He was served with a fine challan. The mood was suddenly spoiled after having a great time at the party.

(i) What is breathalyser and what is its function ?

(ii) What are the harmful effects of excessive intake of alcohol ?

(iii) What is denatured alcohol ?

Ans. (i) Breathalyser is an instrument to check the presence of alcohol in the breath. If the test is positive that means the person has consumed alcohol. Driving after taking alcohol is banned.

(ii) Excessive drinking slows metabolic processes and depresses central nervous system. This results in lack of coordination, mental confusion and drowsiness. The person loses sense of judgment and sense of timing.

(iii) To prevent the misuse of ethanol produced for industrial use, it is made unfit for drinking by adding poisonous substances like methanol to it. This is called denatured alcohol.

Q.5. Sita was helping her mother in washing clothes in her village. They were experiencing difficulty in the process. They found that the soap foam was obtained with difficulty and an insoluble substance (scum) was left on the clothes even after repeated washing. Suddenly, Sita's elder brother came who was studying in class X in a city school. Sita narrated the incident and asked the reason for what was happening.

(i) How did Sita's brother explain the difficulty in getting clean clothes ?

(ii) What remedial action could be taken to achieve proper cleaning of clothes ?

Ans. (i) Sita's brother explained that this difficulty in washing clothes arises due to hard water which contains chlorides and sulphates of calcium and magnesium. These salts produce scum with soap. These are insoluble salts, stick to the clothes and are not removed even after repeated washing.

(ii) We should either use soft water which is free from the calcium and magnesium salt or we should use detergents in place of soap. Calcium and magnesium salts do not produce scum with detergents.

2. PERIODIC CLASSIFICATION OF ELEMENTS

Q.1. Rita and Geeta were studying the chapter on Periodic Classification of Elements. They found an interesting relation between the atomic masses of Li, Na and K. The atomic masses of Li, Na and K are 7, 23 and 39 respectively. They found that the atomic mass of the middle atom Na is the average of the masses of the other two elements. "That is amazing. Let

us find out some other groups of three elements having such a relation in their atomic masses”, said Rita to Geeta.

(i) Can you find two other groups of three elements having approximately similar relation between the atomic masses ?

(ii) What are such groups of elements called ? Who noticed this phenomenon first ?

Ans. (i) The other two groups with similar relation in their atomic masses are

(a)	Cl	Br	I
	35.5	80	127

(b)	Ca	Sr	Ba
	40	87	137

(ii) Such groups of three elements in which the mass of the middle element is approximately the average of masses of the other two elements are called triads. This phenomenon was first discovered by Dobereiner.

Q.2. The captain of a cricket team prepared a table of the players. He placed the players with bowling performance in a column in order of performance, with the least credit at the top and the highest credit at the bottom. Similarly placed players with batting and fielding performance in different columns. He thus obtained a comprehensive table. This helped the captain to manage his team.

(i) Does this have analogy to anything in chemistry ?

(ii) How many columns and rows (periods) do you have in the table in your answer ?

(iii) What name is given to the members in the last column ?

Ans. (i) There is an analogy between the table prepared by the captain and the Periodic Table of elements. Elements having similar properties are placed in the same column (called group) of the Periodic Table and the elements in the group are arranged in increasing order of atomic numbers.

(ii) There are 18 columns (groups) and 7 rows (periods) in the periodic table.

(iii) Elements in the last column (group 18) are called noble or inert gases.

Q.3. Ramakant, Ashwini and Dipit are friends but have different nature. Ramakant and Ashwini often go to school canteen for refreshment but Dipit does not accompany them. It is usually Ramakant who pays the bill. Ashwini generally avoids paying the bill on one excuse or the other. Dipit believes neither in paying nor accepting money.

(i) Can you compare these traits of three friends with the elements in the periodic table ? How ?

(ii) Which elements in the periodic table are metalloids ?

Ans. (i) Elements of groups 1 and 2 can be compared with Ramakant. Just as Ramakant parts with the money to pay the bill, elements of groups 1 and 2 are prepared to lose the electrons to complete a reaction. Elements of groups 16 and 17 readily accept the electrons just as Ashwini accepts the hospitality of Ramakant. Elements of groups 18 can be compared with Dipit. Just as Dipit does not invite or accept the invitation to a party etc., elements of group 18 also do not participate in the reaction. They neither accept nor donate the electrons.

(ii) Elements like boron, silicon, germanium, arsenic and antimony are metalloids. They show properties of metals as well as non-metals.

Q.4. In the Indian system of music, there are seven musical notes in a scale – sa, re, ga, ma, pa, da, ni. The notes in a scale are separated by whole frequency intervals of tones. A

musician uses these notes for composing music of a song. Every eighth note is similar to the first one and it is first note of the next scale.

(i) Is the situation above similar to something in chemistry ? Explain.

(ii) What are the limitations of the above principle in your case ?

Ans. (i) The above situation is applicable to Newlands octaves, an earlier version of periodic table of elements as given below :

sa	re	ga	ma	pa	da	ni
H	Li	Be	B	C	N	O
F	Na	Mg	Al	Si	P	S
Cl	K	Ca	Cr	Ti	Mn	Fe

It was noticed that properties of lithium and sodium were similar. Sodium is the eighth element after lithium. Similarly Be and the eighth element after this *viz.*, Mg resemble each other.

(ii) It was observed that the law of octave was applicable only upto calcium, after calcium every eighth element did not possess properties similar to that of the first.

Q.5. In morning assembly in schools, students are made to stand in rows. In every row from front to the back, students are asked to position themselves in order of increasing height. The shortest student is in the front and the tallest student at the back. This is done so that every student is clearly seen from the front.

(i) Is the height of students comparable to elements in the periodic table ? Explain.

(ii) How does the size change in case of elements on moving from left to right in a period ?

Ans. (i) The height of the student is comparable to atomic size of the element as we move from top to bottom in the periodic table. Just as the height increases from front to back, the atomic size increases from top to bottom.

(ii) The reverse trend is observed when we move from left to right in the periodic table. Atomic size decreases in this case.

3. HOW DO ORGANISMS REPRODUCE ?

Q.1. Ramu and Sonu went for a trip to Mughal garden, Delhi during early spring. They saw some plants of beautiful coloured scented flowers. They wondered what is the need for a flower to be so colourful and scented. Then in a flower bed they observed rose plants bearing flowers of same colour and size. Next day they raised this issue by putting following questions :

(a) Why are flowers colourful and scented ?

(b) Why all the flowers in the rose bed were of same size and colour ?

Ans. (a) The flowers of some plants are colourful and scented to attract insects which help in pollination which is essential for fertilisation and subsequent seed formation.

(b) Plants raised by vegetative propagation are exactly like their parents. The roses has been raised by cutting, a type of vegetative reproduction.

Q.2. Reema's mother bought a bread from market. She forgot to store at a proper place. Instead she left it on a humid shelf. Next day she observed greenish black patches all over the bread.

(a) What was the probable cause of it ?

(b) How the bread got infested with it ?

(c) What precautions Reema's mother should have taken to avoid it ?

Ans. (a) It was due to growth of bread mould (Rhizopus).

(b) Rhizopus produces asexually reproducing bodies spores which are always present in the air, whenever they get suitable medium like moisture and temperature.

(c) Reema's mother should have stored the bread in a dry and cool place to avoid growth of fungus on it.

Q.3. One day Prakash accompanied her ailing mother to hospital. There he saw at the door of a ward written as STD Ward. He got confused as the same abbreviation he has seen written in a telephone booth near his house. On the basis of your knowledge how you will solve Prakash's problem quoting suitable examples.

Ans. It will be explained to Prakash that STD written on the door of ward refers to a special ward where patients suffering from sexually transmitted diseases are treated. Such diseases spread through sexual contact and are caused by bacteria and virus. Examples are gonorrhoea, syphilis, AIDS.

While the STD written on the board of a shop refers to a telephone booth from where one can call people living in other town. The STD here stands for straight trunk dialing.

Q.4. One day Seema asked her mother, "Mama, our bitch delivers four or five puppies at a time. While human female usually gives birth to a single baby or twins." What explanation is expected from her mother ?

Ans. In dogs more than one egg is produced and fertilised resulting in birth of four or five puppies. However in humans only one egg matures and fertilises at a time resulting in a single child.

Occasionally if two eggs are produced and fertilised twins are born. Sometimes the zygote divides into two at early stages of embryo development resulting in twins.

4. HEREDITY AND EVOLUTION

Q.1. Mahesh lives in a colony having lots of mosquitoes. One day the local health body sprayed insecticide to check the mosquito menace. However even after that some mosquitoes survived and grew. What explanation you can give for this fact ?

(a) Mosquitoes become immune to insecticides as some are more healthy.

(b) Some mosquitoes are capable of metabolising insecticides.

(c) What other reason you can suggest ?

Ans. (a) No.

(b) No.

(c) In a population of mosquito there are certain mosquitoes having a variant gene which makes them resistant to insecticides. Mosquitoes not having the variant gene get eliminated while those having variant gene grow, reproduce and increase their population.

Q.2. Mrs Gayatri is four-month pregnant and is worried whether the child is male or female. One day she reads an advertisement regarding a medicine which if taken for 3 months results in birth of male child. What should she do ?

(a) Get the medicine and take it regularly.

(b) Visit a doctor and discuss the problem with him/her.

(c) What, in your opinion, are chances of having a male child ?

Ans. (a) No, she should not take the medicine.

(b) Of course she should visit a doctor to get information.

(c) She is having 50% chances of having a male child as 50% sperms carry Y chromosome and 50% X chromosome.

Q.3. After reading about Mendel's experiment on sweet pea Renu wanted to repeat the same in his kitchen garden. She bought sweet pea seeds and sowed them. After few months when the plants started flowering she observed that all the plants were tall.

(a) Why all plants were tall ?

(b) Under which condition she could have observed both tall and dwarf plants ?

(c) If she collects seeds from her garden and sows them, what type of plants she is expected to get ?

Ans. (a) Either the seeds bought by her were of pure tall plant (TT) or a hybrid having gene for both tallness and dwarfness (Tt).

(b) If the seeds bought by her had been of pure tall and dwarf type, she would have got both tall and dwarf plants.

(c) In case the seeds sown by her earlier are of pure tall type, all the plants will be tall. In case seeds are of hybrid tall (Tt) type then 75% of plants will be tall and 25% will be of dwarf type.

Q.4. In Rahul's class, routine blood test was done to know the blood group of each student so that it could be entered in their Identity cards. Rahul was told that his blood group is O⁺. He already knew the blood group of his father is B type and that of mother of A type. He got confused why his blood group is O.

(a) Is it possible that parents having A and B blood group can have children with O type blood group ?

(b) What could be the possible blood group of Rahul's siblings ?

(c) Do you see any other symbols along with your blood group test report ?

Ans. (a) Yes, it is possible that parents having blood group A (AO) and B (BO) can have children with O blood group.

(b) A, AB and O blood groups are the possible blood groups of Rahul's siblings.

(c) Yes, its either Rh⁺ or Rh⁻ symbols written along the blood group.

Q.5. Meenu who is four months pregnant, went to a doctor for a routine check. The doctor asked her to get an ultrasound done. Meena asked the doctor after the ultrasound was done whether the sex of baby can be known by this test.

(i) What will be the reply of the doctor ?

(ii) If he says yes, whether he should tell the couple about the sex of the baby ?

(iii) Why should the doctor not disclose the sex of the baby to the parents ?

Ans. (i) Doctor will tell them that the sex of the baby can be known by this test.

(ii) Even he knows the sex of the baby he will not disclose it to the couple.

(iii) If the couple knows the sex of the baby and in case it is a female child they may try to get it aborted. Hence it is moral duty of the doctor not to divulge the sex of the unborn baby.

5. LIGHT : REFLECTION AND REFRACTION

Q.1. Nisha was fond of chocolates and chewing gums. Her friend Smita tried to dissuade her but in vain. One day Nisha, while sitting in her class room, started feeling toothache. Even then she ignored it and continue to take chocolates and gums. With in few days the problem

of Nisha unbearable. Smita's father was a dentist. Smita advised Nisha to accompany her and just consult her father. Nisha agreed and went to Smita's home. Smita's father examined the teeth of Nisha using a mirror. After examining her teeth Smita's father told Nisha that due to excessive use of chocolates her teeth have just started decaying. At the moment the problem can be solved by simple medication. But he advised Nisha to discontinue eating chocolates and using chewing gums. He also told her about proper care of her teeth and gums *viz.*, Nisha should clean her mouth after every meal and she should brush her teeth with a good quality tooth paste in the morning and before going to bed. Nisha accepted the advice of doctor and got rid of her toothache.

(i) Which mirror was used by the doctor to examine Nisha's teeth ?

(ii) What was the purpose of the mirror used by the doctor while examining the teeth of Nisha ?

(iii) What values were exhibited by Smita as well as her father ?

Ans. (i) Doctor used a concave mirror of small focal length to examine Nisha's teeth.

(ii) The purpose of the mirror was to form magnified image of the teeth so that Doctor could see the cavities formed or other defects of teeth.

(iii) Smita is caring and has concern for Nisha. She took Nisha to his dentist father for examination/treatment of her teeth.

Smita's father is a dedicated doctor and treats the patients with utmost care. She gave proper advice to Nisha for maintaining her teeth healthy and clean.

Q.2. Suresh is a student of 5th class. One day he went to see a science exhibition along with his elder brother Mukesh, being organised by a scientific organisation in the college of Mukesh. Suresh and Mukesh entered in a semi-dark room in which mirrors were fitted on the walls. Suresh saw his images which were distorted one. In one image Suresh found himself to be too much of dwarf size and thinner but in other image he found himself to be too bulky and so on. Suresh was perturbed and started crying. His brother Mukesh took him out of the room, where a simple plane mirror was fitted on the wall, Suresh saw his image in the plane mirror and observed his actual image. Later on Mukesh explained the mechanism of mirrors being put on the walls of semi-dark room.

(i) Which mirror forms an enlarged and erect image of a person ? Can the mirror form an inverted image too ? If yes, under what condition ?

(ii) Which mirror form a diminished image of a person ? Can the mirror form an inverted image too ?

(iii) What quality was exhibited by Mukesh ?

Ans. (i) A concave mirror can form enlarged and erect image of a person. The mirror can also form an inverted image of a person. If the distance of an object from the concave mirror is less than its focal length then a virtual, erect and enlarged image of the object is formed by the mirror. However, if the distance of the object from the concave mirror is more than its focal length, we observe a real and inverted image of the object.

(ii) A convex mirror forms a diminished and erect image of a person. It cannot form an inverted image of an object.

(iii) Mukesh is extremely concerned for his younger brother Suresh. He consoles Suresh and explain to him the real cause of different types of images formed. Thus, he removed the fearfulness of Suresh.

Q.3. Sushila and her mother were travelling in a local train in Delhi. When they alighted from the train at their destination, they met a person just outside the railway station. He requested Sushila's mother to listen to him for a minute. The person narrated his story that he is a businessman of Surat and had gone to Amritsar in connection with his business. However, during the journey back from Amritsar to Surat he lost all his belongings during night when he was in sleep. So he has to disembark at Delhi. Being a rich businessman he can't beg for money from anybody and wants to sell his diamond studded gold ring so that he get enough money to reach Surat from Delhi. Sushila's mother offered to help him. Although Sushila tried to dissuade her mother but she purchased the ring in one thousand rupees. After returning to her home Sushila's mother showed the ring to her husband and boasted that I have bought a real diamond studded gold ring at such a cheap rate. Her husband got the ring checked by a jeweller. The jeweller found that so called diamond was polished piece of glass and the ring was of copper coated with a thin coating of gold. When Sushila's mother came to know this, she felt sorry for her act.

- (i) What is the special optical quality of diamond and what is its cause ?
- (ii) What are the values of refractive indices of diamond and glass ?
- (iii) What properties were displayed by the so called businessman of Surat ?
- (iv) What characteristics were exhibited by Sushila's mother while purchasing the ring ?

Ans. (i) The diamond shines brilliantly even in dim light. This is on account of high refractive index of diamond.

- (ii) Refractive index of diamond is 2.42 and that of common glass is 1.50.
- (iii) The so called businessman of Surat was a cheater as well as a liar.
- (iv) Sushila's mother was kind to help others. However, she also wanted to have a good bargain too while helping the so called businessman of Surat.

Q.4. There are many stories linked to king Akbar and his courtier Birbal. Here is one such story. One day a man, named Ramji Lal, came to the court of king Akbar and lodged a complaint about a person named Jhagdu of his village. The king asked to know the problem. Ramji Lal said that Jhagdu is demanding 100 gold coins from him as refund of the coins given by Jhagdu to Ramji Lal in his dream last year. Akbar asked Birbal to solve the problem. Birbal invited both the persons next day in the court. Next day when both Ramji Lal and Jhagdu came to the court, Birbal asked Jhagdu to narrate his version of the story. Jhagdu told Birbal that last year he had given 100 gold coins on loan to Ramji Lal and now wanted the same coins back from him. Birbal arranged a large size plane mirror and put 100 gold coins in front of the mirror. He asked Jhagdu to count the coins. Jhagdu counted the coins and said these are 100. Then Birbal asked and how many coins are there in the image. Jhagdu said, obviously these are 100 in number. Birbal asked Jhagdu to pick up 100 coins being seen in the image. At this suggestion of Birbal Jhagdu felt ashamed Ramji Lal had a sigh of relief.

- (i) What are the characteristics of image formed by a plane mirror ?
- (ii) Which phenomenon is responsible for formation of image by a plane mirror ?
- (iii) What is the moral of the story ?

Ans. (i) Image formed by a plane mirror is virtual, erect and of same size as the object. The image is formed as much behind the plane mirror as the object is in front of it. Moreover, the image is laterally inverted one.

(ii) Phenomenon of reflection is responsible for formation of image by a plane mirror.

(iii) Tit for tat or as you do to others, same treatment you get from others.

Q.5. On a weekend four friends, who used to work as software engineer in a KPO organisation, went on a long drive in a car. Mehtab was driving the car while the other three friends was sitting in the car. Suddenly Mehtab observed from his side mirror that a car, which was behind their car, had met with an accident. Mehtab immediately stopped his car. He opened the car gate and came out and asked his three friends also to follow him. They went to the car which had met with an accident. They managed to take the persons of that car to a nearby hospital, where they were provided proper medical care. In this way precious lives of persons sitting in car were saved.

(i) What is the nature of the side mirror in a car ? What are the characteristics of image formed by this mirror ?

(ii) What is the main purpose of the side view mirror of a car ?

(iii) What values were exhibited by Mehtab and his friends ?

Ans. (i) The side mirror is a convex mirror. Image formed by a convex mirror is virtual, erect and diminished one.

(ii) The side view mirror of a car is used to enable the car driver to see traffic behind him/her to facilitate safe driving.

(iii) Mehtab was considerate and had a presence of mind as well as ability to take a quick decision. Mehtab and his friends were helpful to needy persons.

6. THE HUMAN EYE AND THE COLOURFUL WORLD

Q.1. Sunil is a student of class VIII in a public school in Delhi. During summer vacation his parents planned a visit to Haridwar by their own car. During the journey from Delhi to Haridwar Sunil sat on the front seat and his father was driving the car. Sunil observed that the road ahead on the highway appears to be wet but when the car reached the spot, road is found to be dry. He was perplexed by this observation. He asked his father. His father advised Sunil not to disturb him during driving and said that he will discuss the problem on reaching Haridwar. In the evening when they were settled in a hotel at Haridwar, Sunil's father told him that the illusion observed by Sunil was on account of atmospheric refraction. Now Sunil was happy as he knew the real explanation of his observation.

(i) What is atmospheric refraction ?

(ii) Name any two phenomena based on atmospheric refraction.

(iii) What characteristic was shown by Sunil during his journey ?

(iv) What advice was given by Sunil's father to him and Why ?

Ans. (i) Atmospheric air layer just near the earth surface is comparatively denser and upper layers of atmosphere are successively rarer and more rarer. Since the physical conditions of air are not stationary, the apparent position of any distant object, as seen through the atmospheric air, fluctuates. It is the effect of atmospheric refraction.

(ii) Twinkling of stars as well as the phenomena of advance sunrise and delayed sunset are based on atmospheric refraction.

(iii) Sunil had a very good observational power during his journey. He keenly watched the surrounding environment from the car.

(iv) Sunil's father advised him not to disturb a person who is driving a vehicle because it may disturb the concentration of the person.

Q.2. Ashok and his classmates had gone to visit Assam on an educational trip organised by their school. One day in the early morning they went on an elephant safari in Kajiranga wild life sanctuary park. Suddenly Ashok observed bright light through a canopy of dense forest. Ashok observed carefully through the bright lit canopy that few persons were cutting a tree and more over they had bows and arrows with them. Ashok narrated whole thing to his teacher incharge, who inturn informed the police as well as forest department officials. Soon a raid was conducted by police officials and the gang of poachers was caught red handed.

(i) Name the phenomenon involved due to which Ashok could observe bright light through a canopy of dense forest. Can you explain the phenomenon ?

(ii) What values were exhibited by Ashok and by his teacher ?

(iii) Why does sky appears blue ?

Ans. (i) Ashok observed bright light through a canopy of dense forest due to the phenomenon of Tyndall effect. According to Tyndall effect when a beam of light strikes fine particles, colloidal solution particles etc., the path of the beam becomes visible.

(ii) Ashok had a keen observing power. He had an ability of quick judgement and immediate action. He was a law abiding person who wanted that a law breakig person should be punished.

Ashok teacher was a law abiding citizen and did his duty by informing the police authorities about the pochng incident.

(iii) Sky appears blue on account of scattering of light due to atmospheric particles. Very fine atmospheric particles scatter mainly blue light. As a result of which the sky appears blue.

Q.3. In a township there was a woman named Ramkali. She was a widow and alone. She used to sew clothes to fulfil her daily needs. One day Sudha along with her mother went to her to get her school uniform stitched. Ramkali told them that for last few months she was feeling a difficulty in putting the thread through the hole of sewing needle and had to use much bright light while stitching clothes. Sudha was a science student and understood the problem of Ramkali. She requested her parents to help Ramkali. They arranged a thorough examination of Ramkali's vision by an eye specialist. Ramkali was suffering with near-sightedness. Doctor prescribed Ramkali spectacles with lenses of power + 2.0 D. Sudha's parents got a spectacle prepared for Ramkali and presented it to her. Now she was happily as she could stitch the clothes better and without strain on her eyes.

(i) What is near-sightedness ? What is its cause ?

(ii) Define power of a lens. What is its SI unit ?

(iii) What value was shown by Sudha ? What value was shown by her parents. ?

Ans. (i) Near-sightedness is the defect of vision due to which the suffering person can clearly see objects situated near the eye but cannot see distant objects distinctly. Near-sightedness is due to either (a) excessive curvature of the eye lens, or (b) elongation of the eye ball.

(ii) Power of a lens is reciprocal of its focal length expressed in metres. SI unit of power is 1 diopter (1 D). Power is said to be one diopter if focal length of a lens is 1 m.

(iii) Sudha displayed the qualities of presence of mind, high degree of general awareness, ability to take prompt action and concern for mother of her friend. Sudha's parents have empathy and are of helping and caring nature.

Q.4. Arun and some friends lived in a village. Their school was about three kilometers from their village. Their passage was close to a railway track. Everyday, while going from their village to school and back Arun and other friends used to look at the railway track and train passing on the track. One day, while returning from his school to his village, Arun observed that a couple of fish plates were missing from one side of railway track. Arun thought for a few moments. Then he asked his friends to run fast and inform the nearest railway cabinman about this. He himself put off his red T-shirt and started to waive it along the railway track. A train was approaching towards that spot. When driver of train saw a young boy standing near the railway track and waving his red T-shirt, he applied brakes and stopped the train just before the spot. In the mean time cabinman also reached there. In this way, a possible train accident was avoided. Arun's school honoured him and his friends for this act.

(i) Why did Arun waive his red T-shirt ?

(ii) Which optical phenomena is involved here ?

(iii) What values were exhibited by Arun and by his friends ?

Ans. (i) Arun waived his red T-shirt so that the driver of an approaching train may come to stop on seeing the red signal and there may not be any mishap due to missing fish plates from the railway track.

(ii) The phenomenon involved is scattering of light. Light of red lights is scattered the least and hence red light signal is visible even from a far off place.

(iii) Arun and his friends had courage, presence of mind, general awareness, capability of quick action and duty towards the society and the nation.

Q.5. Anita has been a student of class VII. On one pleasant evening in the month of August Anita and her friends were playing in a park in their locality. Suddenly they observed a beautiful coloured arc spread along the sky in the east direction *i.e.*, opposite to that of the sun. One girl said that is the rainbow and during rainy season Lord Indra used to guide clouds with the rainbow. Anita could not believe. When she returned home, she asked her elder brother about the rainbow. Her brother, who was doing a course in Physics (Hon's) in a college, explained to Anita that rainbow is a natural optical phenomenon. Now Anita knew the real fact about rainbow.

(i) In your opinion what is a rainbow ? How is it formed ?

(ii) In which direction is rainbow seen ?

(iii) What value was shown by Anita ? Why Anita did not believe her friends' view on rainbow ?

Ans. (i) A rainbow is a natural spectrum appearing in the sky after a rain shower. It is caused by dispersion of sunlight by tiny water droplets present in the atmosphere.

(ii) Rainbow is always formed in a direction opposite to that of the sun.

(iii) Anita had a scientific bent of mind and did not believe on mere hear say. She did not believe her friends view because she knew that cloud formation is a physical phenomenon and it has nothing to do with Lord Indra.

7. OUR ENVIRONMENT

Q.1. Suresh's brother was bitten by a snake in his farm last year. Suresh's father called a snake charmer and asked him to catch as many snakes from his wide spread farms as possible. The snake charmer caught a large number of snakes and got a handsome amount in

return. One year has passed. Now Suresh's family is facing the problem of rats who are destroying their crops.

(i) What is the relationship between the catching of snakes and destruction of crops by rats ?

(ii) What is meant by trophic level ?

Ans. (i) There are food chains in every ecosystem. A life form gets its food from one life form and becomes the food for another life form. In the terrestrial ecosystem, there are farmlands, rats and snakes. Rats eat the crops and snakes eat the rats. Also snakes are eaten by vultures and peacocks. We call it food chain. There is a balance of life forms in the ecosystem. If one of the components of the ecosystem is removed, an imbalance is created. After the snakes were captured from the farms, there was an excess of rats which indulged in destroying the crops.

(ii) Each step or level in a food chain is called trophic level.

Q.2. If you go to remote countryside, you still find shopkeepers selling curd or hot milk in *kulhads*. People living in cities may find them strange. If we think deeply they have an advantage too. In cities, ton of packing and serving material is made of plastic. Plastic is a non-biodegradable substance. It does not decompose even after long standing. That creates an environmental problem. On the other hand, *kulhads* are made of clay and are biodegradable. In fact one of our former railway minister advocated the use of *kulhads* at railway stations and inside the trains.

(i) What is the best way if at all we have to use plastic material in catering ?

(ii) What adverse effect takes place due to our changed attitude in modern times ?

Ans. (i) The plastic tray, cups etc., used in catering should be made of superior material and should be thick. It can be used as indisposable or reusable matter to be used next time. This way not much of plastic will go into the environment.

(ii) Improvement in our life style have resulted in greater amount of waste material generation. Changes in our attitude have a role to play, with more and more things we use becoming disposable. Changes in packing have resulted in much of the waste becoming non-biodegradable.

Q.3. There are instructions from the civic authorities to segregate the domestic waste into two parts — biodegradable and non-biodegradable. So when the garbage collection van comes to your house, the workers expect you to hand over the garbage separately. The biodegradable part is constituted of left over food, peels of vegetables and fruits. The non-biodegradable part is constituted of glass, plastic, tin, etc.

(i) What are the advantages of collecting the waste separately ?

(ii) How should we treat the non-biodegradable part of garbage ?

Ans. (i) It is a nice idea to collect the garbage into two parts. Biodegradable part made up of organic waste like left over and spoiled food, peels of fruits and vegetables can be used to prepare manure. The process consists in dumping this part underground and then covering it with a thick layer of sand or clay. After about a month, biowaste is converted into manure which can supply nutrients to the plants and crops.

(ii) Non-biodegradable waste containing glass, plastic and metals should be further segregated into separate constituents. All these components should be recycled which can be reused.

Q.4. There has been an outbreak of malaria in a village. Local hospitals are full with no beds available for the patients. Patients are being taken to distant hospitals. A meeting of the Panchayat was held to discuss the situation. No body is able to understand why suddenly there is a spurt in the population of mosquitoes. Experts from the district health office were called, who explained to the people why this situation has evolved.

(i) What according to the experts is the reason for the outbreak of malaria ?

(ii) What message can you give prevent the recurrence of such catastrophe ?

Ans. (i) According to the experts, there has been a disruption in the side chain. Mosquitoes are eaten by frogs and frogs are eaten by snakes while snakes are eaten by vultures. The experts observed that a number of vultures were found dead probably by eating dead animals. These animals died due to insecticide poisoning. When there were no vultures, snakes population increased and they finished frogs population. When there were no frogs, population of mosquitoes increased and they spread malaria.

(ii) As insecticides are the main culprits, we need to limit its use. We should rather go for green stuff which is free from fertilisers and insecticides. This can save us from this kind of situation.

Q.5. Vineet and his four friends went to Haridwar on the occasion of Kumbh Mela. Lakhs of people from India and even abroad visit Haridwar because of the religious faith. They were shocked to find dirt and garbage everywhere in the town. Vineet and his friends thought that they can also do something to alleviate this problem and help in the cleanliness of the town.

(i) What measures could have been taken by Vineet and his friends for the cleanliness ?

(ii) What values do you attach to Vineet and his party for the initiatives taken by them ?

Ans. (i) Vineet and his party had a strength of 10. They collected 1000 rupees each. Thus the total collection with them was ₹ 10,000/-. With that money, they purchased plastic bins worth ₹ 200/- each. Thus, they had 50 plastic bins with them. They placed these bins at different places in the route from bus stand to the river Ganga. This was the route where there was a maximum number of pilgrims. Pilgrims who were throwing banana peels and packaging material on the road now found the bins and used them. The roads and surroundings which were earlier looking ugly now presented a good look.

(ii) Each one of us should have such spirit of doing good for a common cause. Vineet and his party displayed exemplary qualities and deserve all praise for saving the place from ugly scene.

Q.6. Sunil and Sumeet were happy that they have been selected for a trip to Antarctica. They enjoyed all the way to Antarctica and then spent a couple of days there. After returning home, both of them started complaining of rashes and itches. They were feeling very uneasy and all the charm and happiness of visiting Antarctica was gone. They consulted a doctor who diagnosed both of them with skin cancer.

(i) What do you think could have been the reason behind Sunil and Sumeet contracting skin cancer ?

(ii) What precautions should be taken to prevent this from happening ?

Ans. (i) The reason behind Sunil and Sumeet contracting skin cancer is ozone hole or depletion of ozone layer. There is a layer of ozone around our earth at higher altitudes. This ozone layer

prevents ultraviolet rays emanating from the sun to reach the earth. Ultraviolet rays are high energy rays and cause skin and other problems to living beings. Chlorofluorocarbons which are used as cooling gases in refrigerators react with ozone and cause reduce the thickness of ozone layer. In such a situation, ozone layer will not be able to stop the entry of ultraviolet rays into earth's atmosphere. There was a report that such thinning of ozone layer has taken place at Antarctica. That is why Sunil and Sumeet became victims of skin cancer.

(ii) We should minimise the use of chlorofluorocarbons and whenever we observe a leakage of this gas in our refrigerators or ACs, we should take immediate action to plug the leak.

8. MANAGEMENT OF NATURAL RESOURCES

Q.1. Ramesh and Pradeep were driving through Connaught Place in Delhi. Their car was moving at a very low speed. There was almost bumper to bumper traffic. They needed to go to a common friend who lived 3 km from there. They were midway and already 30 minutes had passed. There was such a heavy traffic in all the lane that their car was hardly moving. Ramesh said to Pradeep, "If the rate of manufacture of vehicles remains this, it will become a hell to live in cities. We must take some measure to address the problem".

(i) What measures can you suggest to check the alarming condition of traffic in big cities ?

(ii) What are fossil fuels ? How were they formed ?

Ans. (i) Ramesh and Pradeep are right when they say that living in big cities will become a hell if the vehicles are produced at this rate. We find that rich families possess two or more cars. Every member uses his vehicle independently when he/she has to go somewhere. Some of the measures to address this problem are :

1. Only one car should be permitted per family of four members. In case of joint families two cars may be permitted.

2. For going to the office, car pools may be formed. Five persons may form the pool. Every member will take other four members for one day.

3. Persons going to sports stadium and gymnasium may use bicycle.

(ii) Coal and petroleum occur underground. Petroleum also occurs under the sea bed. These fuels were formed by the degradation of biomass millions of years ago.

Q.2. Parineeta and Vivek were commenting on the increase in power rates by the Electricity Board. Parineeta said, "The Electricity Board was raising the tariffs almost every six months. Why is this happening ?" Vivek said, "The consumption of power is increasing and its production is becoming costlier because of the increase in the price of fuels. We must do something to check its consumption".

(i) Suggest some ways to limit the consumption of power.

(ii) What will happen if we do not adhere to controlled use of power ?

Ans. (i) Some of the ways to limit the consumption of power are

1. Use CFLs or fluorescent tubes in place of bulbs.

2. Take stairs to reach your flat in place of lifts. Small children and older people can be excepted.

3. Wear an extra sweater in place of room heater in winter.

4. Take a public transport in place of your car as far as possible.

(ii) If we do not follow controlled use of power (remember petrol and diesel are also forms of power), a huge amount of carbon dioxide will be produced as a result of combustion. Carbon dioxide is a greenhouse gas. It will result in global warming. This earth will not be worth living on.

Q.3. Meera and Radhika were on a trip to Mussoorie. They set out on a short trekking on the hills. They were closely watching the flora and fauna in the area. They felt that the area has sufficient biodiversity. This was possible because the forests had remained safe. There was no visible sign of cutting of trees. Meera said with pride to Radhika, "Do you know women have played a prominent role in the protection of forests ? Without their brave acts, the situation would have been different and miserable."

(i) Name two incidents from history when women environmentalists saved the trees from felling by greedy and powerful people.

(ii) What is meant by biodiversity ?

Ans. (i) (a) Amrita Devi Bishnoi sacrificed her life along with 365 other women sacrificed for the protection of khejri trees in Khejrli village near Jodhpur. This happened in the year 1731. Govt. of India has instituted a National Award for wildlife protection in her memory.

(b) Another incident occurred in 1970's in a remote village called Reni in Garhwal high up in the Himalayas. There was a dispute between local villagers and logging contractor who had been allowed to fell trees in a forest close to the village. On a particular day, the contractor's men appeared in the forest to cut the trees while the men folk were away. On knowing, womenfolk of the village reached the forest quickly and clasped (hugged) the tree trunks thus preventing the workers from felling the trees. The contractor's men had to withdraw.

(ii) Biodiversity is the presence of different forms of lifeforms like plants, shrubs, trees, insects, small and big animals in a particular area.

Q.4. Forest resources ought to be used in a manner that is both environmentally and developmentally sound. In other words, while the environment is preserved, the benefits of controlled exploitation go to the local people, a process in which decentralised economic growth and ecological conservation go hand in hand.

(i) Give an example of people's participation in the management of forests.

(ii) How should we use natural resources ?

Ans. (i) In 1972, the West Bengal Forest Department recognised its failures in reviving the degraded *Sal* forests in south-western districts. The surveillance and policing by the Govt. had led to frequent clashes between the forest officials and villagers. The Department changed its strategy. They made a beginning in Arabari forest range of Midnapore district under the control of A.K. Banerjee, a far-seeing forest officer. Villagers were involved in the protection of 1272 hectares of badly degraded *Sal* forest. In return, villagers were given employment in silviculture and harvesting operations, 25 per cent of the final harvest and allowed fuelwood and fodder collection at nominal charges. Arabari underwent a remarkable recovery by 1983.

(ii) Natural resources should be used with due caution for our economic and social growth and to meet our material needs.

Q.5. Preeti and Vidya had read an article in a magazine on environment. A lot of concern had been expressed on depleting sources of energy. It was mentioned that the petroleum reserves under the earth could last for another forty years and coal reserves could last for

another two hundred years. A grim situation had been painted. Preeti asked, "What our next generations would do without petroleum and coal ? How will people drive their cars and how will electricity be generated ?" Vidya said, "There is nothing to feel dejected and powerless. We had the principle of three R's."

"Three R's ? What is that ?" asked Preeti.

(i) Explain in detail the principle of three R's.

(ii) What is the concept of sustainable development ?

Ans. (i) Reduce – That means you use or consume less. You can save electricity by switching off unnecessary lights and fans. In fact, whatever we consume or use consumes power. You can save water by repairing leaky taps.

Recycle – That means you collect plastic, paper, glass and metal items and recycle these materials to make required things instead of synthesising or extracting metals from the mines. To achieve this, we shall have to segregate waste into biodegradable and non-biodegradable items.

Reuse – This is actually even better than recycling because the process of recycling requires some energy. Thus we use things again and again. Thus, we may use reusable plates and cups. Plastic bottles of jams and pickles can be used for storing kitchen items.

(ii) The concept of sustainable development encourages form of growth that meet current basic human needs, which preserving the resources for the needs of future generations.